AM

5PP

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF PREVENTION, PESTICIDES AND TOXIC SUBSTANCES

February 8, 2002

MEMORANDUM

SUBJECT: Occupational and Residential Exposure Assessment and Recommendations for the Reregistration Eligibility Decision (RED) Document for Propanil (1st Revision)

FROM: Shanna Recore, Industrial Hygienist
Reregistration Branch II
Health Effects Division (7509C)

TO: Rich Griffin, Risk Assessor
Reregistration Branch II
Health Effects Division (7509C)

THROUGH: Alan Nielsen, Branch Senior Scientist
Reregistration Branch II
Health Effects Division (7509C)

****THIS DOCUMENT SUPERCEDES ALL PREVIOUS OCCUPATIONAL****
AND RESIDENTIAL EXPOSURE ASSESSMENTS

1/61

Please find the review of Propanil.

DP Barcode:	D280853
Pesticide Chemical Codes:	028201
EPA Reg Numbers:	100-982, 100-1036, 5905-68, 5905-77, 5905-182, 5905-495, 5905-523, 9779-272, 9779-306, 9779-338, 9779-340, 9779-343-19713-30, 19719-31, 19713-285, 34704-461, 35935-2, 51036-233, 56077-43, 65656-2, 62719-368, 62719-389, 62719-392, 62719-393, 62719-403, 62719-404, 62719-413, 62719-436, 71085-1, 71085-2, 71085-3, 71085-4, 71085-5, 71085-6, 71085-9, 71085-13, 71085-16,71085-20, 71085-21, 71085-22
PHED:	Yes, Version 1.1

2/51

OCCUPATIONAL AND RESIDENTIAL EXPOSURE/RISK ASSESSMENT AND CHARACTERIZATION

Executive Summary

Propanil is a selective post-emergent herbicide registered for weed control on rice, small grains, and potentially on sod farms. At this time, products containing propanil are intended for occupational uses only. The propanil technical contains 95 to 98 percent active ingredient and is formulated as an emulsifiable concentrate liquid (16.6 to 58 percent active ingredient), a water dispersable granule (or dry flowable) (59.6 to 81 percent active ingredient), soluble concentrate liquid (41.2 to 80.2 percent active ingredient), and a flowable concentrate (41.2 percent active ingredient). Propanil products are applied using the following equipment: aircraft, groundboom sprayers for use on small grains, rice, and potentially turf. Propanil is used in combination with bensulfuron, carfentrazone, molinate, quinclorac, pendimethalin, thiobencarb, and triclopyr and is sold in the following premixes: 1) Arrosolo (propanil and molinate) and 2) DUET (propanil and bensulfuron). Application rates range from 1.14 lbs ai/acre, on small grains, to 6 lbs ai/acre, on rice, to potentially 10 lbs ai/acre on turf.

HED has determined that there are potential exposures to mixer, loader, applicator and other handlers during the usual use-patterns associated with propanil. Based on the use patterns, the following major occupational exposure scenarios were identified for propanil: (1a) mixing/loading liquids for aerial application, (1b) mixing/loading liquids for ground application, (2a) mixing/loading dry flowable for aerial application, (2b) mixing/loading dry flowable for ground application, (3) applying sprays with aerial equipment, (4) applying liquids with groundboom sprayer, and (5) flagging sprays for aerial application. Propanil labels prohibit application by chemigation.

Calculations of non-cancer risk based on dermal and inhalation exposure indicate that the combined dermal and inhalation margins of exposure (MOEs) are **less than the target MOE of 300** with maximum risk reduction measures for the following short- and intermediate-term occupational exposure scenarios listed: (1a) mixing/loading liquids for aerial application to rice at 350, 1200, and 3200 acres at 6 lbs ai/acre, (1a) mixing/loading liquids for aerial application to rice at 1200 and 3200 acres at 3 lbs ai/acre, (1a) mixing/loading liquids for aerial application to small grains at 1200 acres at 1.14 lbs ai/acre, (1a) mixing/loading liquids for aerial application to turf at 350 acres at 10 lbs ai/acre, (1b) mixing/loading liquids for groundboom application to rice at 200 acres at 6 lbs ai/acre, (2a) mixing/loading dry flowable for aerial application to rice at 3200 acres at 6 lbs ai/acre, (2a) mixing/loading dry flowable for aerial application to rice at 3200 acres at 3 lbs ai/acre, (3) applying sprays, using aerial application to rice at 350, 1200, and 3200 acres at 6 lbs ai/acre, and (3) applying sprays, using aerial application to turf at 350 acres at 10 lbs ai/acre.

HED has determined that there are potential exposures to post-application workers during usual use-patterns associated with propanil. For rice and small grains, scouting was assessed for

3/5/

post-application exposure. For sod farms, activities such as, hand pruning, scouting, mechanical weeding, irrigation, hand harvesting, mechanical harvesting, and transplanting were assessed for post-application exposure. For rice, the target MOE is reached one day after application for scouting during minimal foliage development. For small grains, the target MOE is reached on the day of application, after sprays have dried (12 hours after application) for scouting during minimal foliage development. For sod farms, the target MOE is reached on the day of application, after sprays have dried (12 hours after application), for activities such as hand pruning, scouting, mechanical weeding, and irrigation, and 18 days after application for activities such as hand and mechanical harvesting, transplanting, and hand weeding.

4/61

BACKGROUND

Purpose

In this document, which is for use in EPA's development of the propanil Reregistration Eligibility Decision (RED) Document, EPA presents the results of its review of the potential human health effects of occupational and residential exposure to propanil.

Criteria for Conducting Exposure Assessments

An occupational and/or residential exposure assessment is required for an active ingredient if (1) certain toxicological criteria are triggered and (2) there is potential exposure to handlers (mixers, loaders, applicators, etc.) during use or to persons entering treated sites after application is complete. For propanil, both criterion are met.

Summary of Toxicity Concerns Relating to Occupational and Residential Exposures

Acute Toxicology Categories

Table 1 presents the acute toxicity categories as outlined in the *Propanil: Report of the Hazard Identification Assessment Review Committee* (HIARC).[10]

Table 1. Acute Toxicity Categories for Propanil

Study Type	Toxicity Category (Technical a.i.)
Acute Oral Toxicity	II
Acute Dermal Toxicity	III
Acute Inhalation Toxicity	IV
Primary Eye Irritation	II
Primary Dermal Irritation	IV
Dermal Sensitization	not a sensitizer

Non-Cancer Endpoints of Concern

The HIARC memo, dated August 22, 2001, indicates that there are toxicological endpoints of concern for propanil. The endpoints and associated uncertainty factors used in assessing the risks for propanil are presented in Table 2.[10]

6/51

Table 2. Propanil Hazard Endpoints and Uncertainty Factors.[10]

Route / Duration	NOAEL (mg/ kg/day)	Effect	Study	Uncertainty Factors
Incidental Oral; Short- and Intermediate-Term	LOAEL = 9	Increased methemoglobin.	Chronic toxicity/ carcinogenicity study in rats	Interspecies: 10x Intraspecies: 10x FQPA: 10x Use of LOAEL:3x
Dermal; Short- and Intermediate-Term	LOAEL = 9	Increased methemoglobin.	Chronic toxicity/ carcinogenicity study in rats	Interspecies: 10x Intraspecies: 10x FQPA: 10x Use of LOAEL:3x
Dermal; Long-Term[a]	LOAEL = 9	Increased methemoglobin and increased spleen weight in females, and small seminal vesicles and prostates in males.	Chronic toxicity/ carcinogenicity study in rats	Interspecies: 10x Intraspecies: 10x FQPA: 10x Use of LOAEL:3x
Inhalation; Short- and Intermediate-Term[b]	LOAEL = 9	Increased methemoglobin.	Chronic toxicity/ carcinogenicity study in rats	Interspecies: 10x Intraspecies: 10x FQPA: 10x Use of LOAEL:3x
Inhalation; Long-Term[b]	LOAEL = 9	Increased methemoglobin and increased spleen weight in females, and small seminal vesicles and prostates in males.	Chronic toxicity/ carcinogenicity study in rats	Interspecies: 10x Intraspecies: 10x FQPA: 10x Use of LOAEL:3x

Footnote

[a] An oral endpoint was used for dermal exposure: dermal absorption factor of 20% of oral exposure shall be used.
[b] An oral endpoint was used for inhalation exposure: inhalation exposure assumed equivalent to oral exposure.

FQPA Safety Factor

The FQPA Safety Factor Committee memorandum, dated September 19, 2001, recommended that the FQPA safety factor be retained at 10x for the following weight-of-evidence considerations:

- there is qualitative evidence of increased susceptibility following pre- and postnatal exposure to propanil in the 2-generation reproduction study in rats;
- a developmental neurotoxicity study with propanil is triggered due to suggestive evidence of neurotoxicity in the data base including

6/51

neuropathological lesions (sciatic nerve degeneration) in a rat chronic/carcinogenicity study; and

- there is also evidence consistent with neuro-endocrine disruption in the two-generation reproduction study in rats and the rat chronic/carcinogenicity study. This evidence is supported by the Structure Activity Relationship (SAR) consideration that linuron, which is structurally related to propanil, has a known neuro-endocrine mode of action.

Safety factor is required for all population subgroups when assessing residential exposures of all duration due to the weight of evidence stated above. However, there are no residential uses or risk concerns for propanil. [3]

Cancer Determination

The Cancer Assessment Review Committee (CARC) classified propanil into the category **"Suggestive evidence of carcinogenic potential by all routes of exposure, but not sufficient to assess human carcinogenic potential."** There was an increase in benign tumors in male rats. But considering the non-mutagenicity of propanil the available evidence for carcinogenicity did not reach the level of concern associated with category "Likely to be carcinogenic in humans." The Committee's decision was based on the following weight-of-the-evidence considerations:

- Propanil induced testicular interstitial cell adenomas in male rats. The hepatocellular adenomas in female rats occurred only at an excessively toxic dose. The increase in commonly occurring malignant lymphomas in female mice added little to the overall weight of evidence for the carcinogenic potential of propanil; and

- Propanil was not genotoxic in a battery of acceptable mutagenicity assays.[8]

SUMMARY OF USE PATTERN AND FORMULATIONS

Occupational-Use

At this time, products containing propanil are intended for occupational uses only. Propanil is a post-emergent herbicide registered for the control of weeds on rice and small grains (including hard red spring wheat, durum wheat, and spring barley), and turf. Although the turf product, Turf EZ (reg. No 56077-43), has never been marketed it will be assessed in this chapter for its potential use on sod farms. The label registrants have agreed to restrict the label to sod use only. Propanil is used alone and in combination with bensulfuron, carfentrazone, molinate, quinclorac, pendimethalin, thiobencarb, and triclopyr and is sold in the following premixes: (1) Arrosolo (propanil and molinate) and (2) DUET (propanil and bensulfuron). [1,2]

7/51

8/51

Type of Pesticide/Targeted Pest

Propanil is a selective herbicide used in commercial settings for the post-emergent weed control of annual grasses and broadleaf weeds which include, but are not limited to, the following:

- barnyardgrass, brachiaris, coffeeweed, crabgrass, croton, curly indigo, ducksalad, foxtail, goosegrass, gulf cockspur, mexicanweed, miller, morning glory, Northern jointvetch, paragrass, pigweek, redstem, sesbania, smallflower umbrellaplant, smartweed, sourdock, sprangletop, spearhead, and wiregrass.[1, 2]

Formulation Types and Percent Active Ingredient

Propanil [3',4'-dichloropropionanilide] is a herbicide that is marketed in a variety of end-use products. There are 3 technical products and 37 registered end-use products that are formulated as follows: emulsifiable concentrate liquid, soluble concentrate liquids, water dispersable granules, and flowable concentrate. Table 1 summarizes all active end-use product formulations:[9]

Table 1: Propanil Available Product Summary

Formulation Type	Percent Active Ingredient	EPA Reg. Numbers
Technical	95, 97, 98	62719-403, 71085-1, 71085-21
Emulsifiable Concentrates	33.1, 33.7, 33.8, 35, 35.01 35.9, 41.2, 42.8, 43.5, 44.5, 44.8, 45, 45.5, 79.2	100-982, 100-1036, 5905-68 5905-182, 5905-495, 5905-523, 9779-272, 9779-343, 19713-30, 19713-285, 34704-461, 35935-2, 51036-233, 62719-386, 62719-389, 62719-392, 62719-403, 62719-404, 71085-2, 71085-3, 71085-20,
Soluble Concentrates	41.2, 45, 50, 80, 80.2	5905-77, 19713-31, 62719-413, 65656-2, 71085-5, 71085-9
Water Dispersable Granules	59.6, 60, 80, 81	9799-306, 9779-338, 9779-340, 62719-436, 71085-4, 71085-6, 71085-13, 71085-16, 71085-22
Flowable Concentrate	41.2	56077-43

9/51

Registered Use Sites

Occupational Use Sites

All propanil products are registered for occupational use only and there are no products intended for sale to homeowners. These products are intended for application to only rice and small grains during different aspects of the growing season. There is currently a registered turf use that has never been marketed and its intended use is only on sod farms.[1,2]

Application Parameters & Cultivation Practices for Rice

A discussion of propanil use practices as they relate to the cultivation of rice were presented by the Propanil Task Force at the April 2001, SMART meeting. There are two main rice regions in the United States in which propanil is used. These regions are California and the Mid-South, which includes Arkansas, Louisiana Mississippi, Missouri and Texas.[2]

In the Mid-South, propanil applications are made primarily by aircraft (greater that 90 percent of the total applied) while the remaining applications are made by ground equipment. In California, a majority of the application are made by ground applications (approximately 80 percent).[2] Chemigation is prohibited on all propanil labels.[1]

Cropping time for rice ranges from approximately 120 to 140 days. In the Mid-South region, usual planting times typically range from early to mid April through late May. In California, most planting is completed during May. Harvest in the southern states can range from the beginning of August through the end of October. Likewise, harvest in California essentially occurs throughout October. Essentially rice is planted and approximately two weeks later a herbicide, such as propanil, is then applied to the planted soil. Approximately two days later, the rice field is flushed. This is called a "temporary flood." Approximately 21 to 30 days later, another application of herbicide is made. The field is then flooded. This is called the permanent flood. Forty to 60 days later, the field is drained. Finally, approximately 90 days after the permanent flood, the rice is mechanically harvested.[2]

Application Rates

The crop groupings with their corresponding maximum application rates are as follows:

- **Rice:** the maximum application rate is 8 lbs ai/acre per season from two 4 lb ai/A applications or a single 6 lb ai/A application emergency treatment;
- **Small Grains:** the maximum application rate is 1.14 lbs ai/A; and
- **Sod farms:** the maximum application rate is 10 lbs ai/A.[1,2]

10/51

Typical Application Rates

Typical application rates for propanil on rice are 2-3 lbs ai/A with an average of 1.1 applications per acre. Typical application rates on small grains are 1-1.14 lbs ai/A.[1, 2]

Method and Types of Equipment Used for Mixing, Loading and Application

Equipment for the commercial use of propanil on both rice, small grains, and potentially turf includes groundboom sprayers and aerial application methods.[1, 2]

Timing and Frequency of Application

Propanil is typically applied post-emergent March through May and requires an average temperature of 70° F to be effective. For weed control on rice, propanil can be applied twice a year, for weed control on small grains, it is usually applied one time a year and for weed control on sod farms it will potentially be applied up to 2 times per year.[1, 2]

OCCUPATIONAL EXPOSURE AND RISKS

Occupational Handler Exposures and Risk Estimates

PHED

Chemical-specific data for assessing human exposures during pesticide handling activities were not submitted to the Agency in support of the reregistration of propanil. It is the policy of the HED to use data from the Pesticide Handlers Exposure Database (PHED) Version 1.1 to assess handler exposures for regulatory actions when chemical-specific monitoring data are not available.[5]

PHED was designed by a task force of representatives from the U.S. EPA, Health Canada, the California Department of Pesticide regulation, and member companies of the American Crop Protection Association. PHED is a software system consisting of two parts -- a database of measured exposure values for workers involved in the handling of pesticides under actual field conditions and a set of computer algorithms used to subset and statistically summarize the selected data. Currently, the database contains values for over 1,700 monitored individuals (i.e., replicates).

Users select criteria to subset the PHED database to reflect the exposure scenario being evaluated. The subsetting algorithms in PHED are based on the central assumption that the magnitude of handler exposures to pesticides are primarily a function of activity (e.g., mixing/loading, applying), formulation type (e.g., wettable powders, granulars), application method (e.g., aerial, groundboom), and clothing scenarios (e.g., gloves, double layer clothing).

11/61

Once the data for a given exposure scenario have been selected, the data are normalized (i.e., divided by) by the amount of pesticide handled resulting in standard unit exposures (milligrams of exposure per pound of active ingredient handled). Following normalization, the data are statistically summarized. The distribution of exposure values for each body part (e.g., chest upper arm) is categorized as normal, lognormal, or "other" (i.e., neither normal nor lognormal). A central tendency value is then selected from the distribution of the exposure values for each body part. These values are the arithmetic mean for normal distributions, the geometric mean for lognormal distributions, and the median for all "other" distributions. Once selected, the central tendency values for each body part are composited into a "best fit" exposure value representing the entire body.

The unit exposure values calculated by PHED generally range from the geometric mean to the median of the selected data set. To add consistency and quality control to the values produced from this system, the PHED Task Force has evaluated all data within the system and has developed a set of grading criteria to characterize the quality of the original study data. The assessment of data quality is based on the number of observations and the available quality control data. These evaluation criteria and the caveats specific to each exposure scenario are summarized in Table 6. While data from PHED provide the best available information on handler exposures, it should be noted that some aspects of the included studies (e.g., duration, acres treated, pounds of active ingredient handled) may not accurately represent labeled uses in all cases. HED has developed a series of tables of standard unit exposure values for many occupational scenarios that can be utilized to ensure consistency in exposure assessments.[4]

Occupational Handler Exposure Scenarios

HED has determined that there are potential exposures to mixer, loader, applicator and other handlers during the usual use-patterns associated with propanil. Based on the use patterns, five major occupational exposure scenarios were identified for propanil:

(1a) mixing/loading liquids for aerial application;
(1b) mixing/loading liquids for ground application;
(2a) mixing/loading dry flowable for aerial application;
(2b) mixing/loading dry flowable for ground application;
(3) applying sprays with aerial equipment;
(4) applying liquids with groundboom sprayer; and
(5) flagging sprays for aerial application.

Propanil labels prohibit application by chemigation. Most current propanil labels have the following PPE requirements for handlers: long sleeve shirt, long pants, waterproof gloves, shoes, socks, protective eye wear. Some labels have additional PPE requirements of chemical resistant headgear for overhead exposure. Other labels state only that eye and skin protection should be worn when handling and entering treated areas before they have dried.[1]

18/51

Assumptions for Handler Exposure Scenarios

The following assumptions and factors were used in order to complete this exposure assessment:

- Average body weight of an adult handler is 70 kg.
- Average work day interval represents an 8 hour workday (e.g., the acres treated or volume of spray solution prepared in a typical day).
- A range of the possible amount of acres that can be treated with propanil, aerially on rice and small grains, in one day are given in this assessment for risk mitigation decision purposes. Rice handler exposures were estimated using 3,200, 1,200 and 350 acres per day for aerial equipment. Small grains handler exposures were estimated using 1,200 and 350 acres per day for aerial equipment. Turf (sod farms) handler exposures were estimated using 350 acres per day. The use of 3,200 acres per day is the high end estimate for rice provided by the Propanil Task Force at the SMART Meeting that occurred on March 23, 2001.[2] The use of 1,200 acres per day is the maximum acres treated aerially per day recommended in ExpoSAC policy # 9 which is based on published scientific literature, surveys, knowledge of agricultural practices, and calculated acreage estimates. The use of 1,200 acres treated in one day by either the mixer/loader or the applicator is considered a reasonable high end estimate used for high acreage field crops and the use of 350 acres per day is considered a reasonable estimate for flaggers.[6]
- For groundboom equipment use on rice and small grains, since they are large acre crops, a range of 80 acres per day to 200 acres per day was used to assess handler exposure. For groundboom equipment use on turf (sod farms), 80 acres per day was used.[6]
- Calculations are completed at the maximum application rates for crops as stated on the designated propanil labels.
- Due to a lack of scenario-specific data, HED calculates unit exposure values using generic protection factors that are applied to represent various risk mitigation options (i.e., the use of PPE and engineering controls).

13/51

Occupational Handler Exposures and Non-Cancer Risk Assessment

Equations to Calculate Handler Exposure

Potential daily dermal exposure is calculated using the following formula:

$$\text{Daily Dermal Exposure}\left(\frac{mg\ ai}{day}\right) = \text{Unit Exposure}\left(\frac{mg\ ai}{lb\ ai}\right) \times \text{Use Rate}\left(\frac{lb\ ai}{A}\right) \times \text{Daily Acres Treated}\left(\frac{A}{day}\right) \times 20\%\ \text{Dermal Protection Factor}$$

Potential daily inhalation exposure is calculated using the following formula:

$$\text{Daily Inhalation Exposure}\left(\frac{mg\ ai}{day}\right) = \text{Unit Exposure}\left(\frac{\mu g\ ai}{lb\ ai}\right) \times \text{Conversion Factor}\left(\frac{1mg}{1{,}000\ \mu g}\right) \times \text{Use Rate}\left(\frac{lb\ ai}{A}\right) \times \text{Daily Acres Treated}\left(\frac{A}{day}\right)$$

The daily dermal and inhalation dose is calculated as follows using a 70 kg body weight:

$$\text{Daily Dermal Dose}\left(\frac{mg\ ai}{kg/day}\right) = \text{Daily Dermal Exposure}\left(\frac{mg\ ai}{day}\right) \times \left(\frac{1}{\text{Body Weight (kg)}}\right)$$

$$\text{Daily Inhalation Dose}\left(\frac{mg\ ai}{kg/day}\right) = \text{Daily Inhalation Exposure}\left(\frac{mg\ ai}{day}\right) \times \left(\frac{1}{\text{Body Weight (kg)}}\right)$$

The dermal and inhalation MOEs were calculated using the following formulas:

$$\text{Dermal MOE} = \frac{\text{NOAEL}\left(\frac{mg}{kg/day}\right)}{\text{Dermal Daily Dose}\left(\frac{mg}{kg/day}\right)}$$

$$\text{Inhalation MOE} = \frac{\text{NOAEL}\left(\frac{mg}{kg/day}\right)}{\text{Inhalation Daily Dose}\left(\frac{mg}{kg/day}\right)}$$

* please note that a LOAEL was used instead of a NOAEL.

14/51

Based on the available toxicity data, it is appropriate to combine short and intermediate term dermal and inhalation MOEs because the effects observed at the LOAEL were identical. The total MOE were calculated using the following formula:

$$Total\ MOE = \frac{1}{\left(\frac{1}{dermal\ MOE}\right) + \left(\frac{1}{inhalation\ MOE}\right)}$$

Table 4 presents the summary of occupational handler short- (1-30 days) and intermediate- (one month to several months) term dermal and inhalation exposures at baseline, with additional personal protective equipment, and with engineering controls. Table 5 lists the caveats and parameters specific to the surrogate data used for each scenario and corresponding exposure/risk assessment.

15/51

Table 4. Summary of Occupational Handler Short-and Intermediate-term Dermal and Inhalation Total Exposure Variables

Exposure Scenario (Scenario #)	Crop	Application rates[a]	Area Treated	Total Short- and Intermediate-term MOE[f] Baseline[b,f]	Total Short- and Intermediate-term MOE Min PPE[c,f]	Total Short- and Intermediate-term MOE Max PPE[d,f]	Total Short- and Intermediate-term MOE Eng. Control[e,f]
Mixer/Loader							
Mixing/Loading Liquids for Aerial application (1a)	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.52	62	85	**170**
			1200 Acres per day	0.15	18	25	**49**
			3200 Acres per day	0.056	6.8	9.3	**18**
		3 lb ai per acre (typical application rate)	350 Acres per day	1.0	120.0	170.0	330.0
			1200 Acres per day	0.30	36.0	50.0	**97.0**
			3200 Acres per day	0.11	14.0	19.0	**36.0**
	Small Grains	1.14 lb ai per acre	350 Acres per day	2.7	330	-	-
			1200 Acres per day	0.79	95	130	**260**
	Turf	10 lb ai per acre	350 Acres per day	0.31	37	51	**10**

Exposure Scenario (Scenario #)	Crop	Application rates[a]	Area Treated	Total Short- and Intermediate-term MOE[f] Baseline[b,f]	Total Short- and Intermediate-term MOE Min PPE[c,f]	Total Short- and Intermediate-term MOE Max PPE[d,f]	Total Short- and Intermediate-term MOE Eng. Control[e,f]
Mixing/Loading Liquids for Groundboom application (1b)	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	2.3	270	370	-
			200 Acres per day	0.90	110	150	**290**
		3 lb ai per acre (typical application rate)	80 Acres per day	4.5	540.0	-	-
			200 Acres per day	1.8	220.0	300.0	-
	Small Grains	1.14 lb ai per acre	80 Acres per day	12	1400	-	-
			200 Acres per day	4.8	570	-	-
	Turf	10 lb ai per acre	80 Acres per day	1.4	160	220	440
Dry Flowables for Aerial application (2a)	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	21	22	32	1100
			1200 Acres per day	6.3	6.6	9.2	320
			3200 Acres per day	2.3	2.5	3.5	**120**
		3 lb ai per acre (typical application rate)	350 Acres per day	43.0	45	63	2200
			1200 Acres per day	13.0	13	18	640
			3200 Acres per day	4.7	4.9	6.9	**240**
	Small Grains	1.14 lb ai per acre	350 Acres per day	110	120	170	5700
			1200 Acres per day	33	34	49	1700

Exposure Scenario (Scenario #)	Crop	Application rates[a]	Area Treated	Total Short- and Intermediate-term MOE[f] Baseline[b,f]	Total Short- and Intermediate-term MOE Min PPE[c,f]	Total Short- and Intermediate-term MOE Max PPE[d,f]	Total Short- and Intermediate-term MOE Eng. Control[e,f]
Dry Flowables for Groundboom application (2b)	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	94	98	140	4800
			200 Acres per day	38	39	55	1900
		3 lb ai per acre (typical application rate)	80 Acres per day	190	200	280	9500
			200 Acres per day	75	79	110	3800
	Small Grains	1.14 lb ai per acre	80 Acres per day	490	-	-	-
			200 Acres per day	200	210	290	10000
Applicator							
Sprays for Aerial application (3)	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	Not feasible.	Not feasible.	Not feasible.	**280**
			1200 Acres per day	Not feasible.	Not feasible.	Not feasible.	**82**
			3200 Acres per day	Not feasible.	Not feasible.	Not feasible.	**31**
		3 lb ai per acre (typical application rate)	350 Acres per day	No Data	No Data	No Data	560
			1200 Acres per day	No Data	No Data	No Data	**160**
			3200 Acres per day	No Data	No Data	No Data	**61**
	Small Grains	1.14 lb ai per acre	350 Acres per day	Not feasible.	Not feasible.	Not feasible.	1500
			1200 Acres per day	Not feasible.	Not feasible.	Not feasible.	430
Sprays for Aerial application (3)	Turf	10 lb ai per acre	350 Acres per day	Not feasible.	Not feasible.	Not feasible.	**170**

10/8/1

Exposure Scenario (Scenario #)	Crop	Application rates[a]	Area Treated	Total Short- and Intermediate-term MOE[f] Baseline[b,f]	Total Short- and Intermediate-term MOE Min PPE[c,f]	Total Short- and Intermediate-term MOE Max PPE[d,f]	Total Short- and Intermediate-term MOE Eng. Control[e,f]
Sprays for Groundboom application (4)	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	370	-	-	-
			200 Acres per day	150	180	230	500
		3 lb ai per acre (typical application rate)	80 Acres per day	740.0	-	-	-
			200 Acres per day	300.0	-	-	-
	Small Grains	1.14 lb ai per acre	80 Acres per day	2000	-	-	-
			200 Acres per day	780	-	-	-
	Turf	10 lb ai per acre	80 Acres per day	220	270	350	-
Flagger							
Flagging for Sprays application (5)	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	120	140	150	5900
		3 lb ai per acre (typical application rate)		240.0	290.0	290.0	12000
	Small Grains	1.14 lb ai per acre	350 Acres per day	620	-	-	-
	Turf	10 lb ai per acre	350 Acres per day	71	87	88	3500

Footnotes:

a Application Rates are based on the maximum application rates listed on the Propanil labels.

b Baseline dermal unit exposure represents long pants, long sleeved shirt, no gloves, open mixing/loading, open cab tractor and baseline inhalation unit exposure represents no respirator[g].

c Minimum PPE for all dermal scenarios include chemical resistant gloves (90% Protection Factor) and minimum PPE for all inhalation scenarios include a dust/mist respirator (5-fold Protection Factor).

d Maximum PPE for all dermal scenarios include double layer of clothing (50% Protection Factor for clothing) and chemical resistant gloves (90% Protection Factor) and maximum PPE for all inhalation scenarios include an organic vapor respirator (90% Protection Factor).

e Engineering Controls for mixer/loader include closed mixing/loading, single layer clothing and scenario 1a and 1b also include chemical resistant gloves. Engineering Controls for applicators and flaggers include enclosed cockpit, cab or truck, single layer clothing, no gloves.

f Total MOE (combined dermal and inhalation) = 1 / ((1/dermal MOE) + (1/inhalation MOE))

where: Short-and Intermediate term dermal MOE = Short-and Intermediate term LOAEL (9 mg/kg/day)/ Daily Dermal Dose (mg/kg/day).
and Short- and Intermediate-term inhalation MOE = Short- and Intermediate-term LOAEL (9 mg/kg/day)/ Daily Inhalation Dose (mg/kg/day).
The target MOE value is 300.

- Scenario's calculated MOE exceeds the target MOE at the previous level of mitigation (MOE>300)

Bolded MOEs have a risk concern at the highest possible level of mitigation for corresponding scenarios

Table 5. Occupational Handler Exposure Scenario Descriptions for the Use of Propanil

Exposure Scenario (Scenario Number)	Data Source	Standard Assumption[a] (8-hr work day)	Comments[b]
			MIXER/LOADER DESCRIPTORS
Mixing/Loading Liquid Formulations (1a, b)	PHED V1.1	• 350, 1200, 3200 acres for aerial rice • 350, 1200 acres for aerial on small grains • 350 acres for aerial on turf • 80, 200 acres for groundboom on small grains and rice • 80 acres for groundboom on sod farms	**Baseline:** Hand, dermal, and inhalation data are AB grades. Hand = 72 to 122 re and inhalation = 85 replicates. High confidence in hand/dermal and inhalation da needed to define the unit exposure value. **PPE:** The same dermal and inhalation data are used as for the baseline coupled w account for an additional layer of clothing, and an 80% protection factor to accou respirator and 90% protection factor to account for the use of an organic vapor re are AB grades, with 59 replicates. High confidence in hand/dermal data. **Engineering Controls:** Hand, dermal, and inhalation data are AB grades. Hand replicates; inhalation = 27 replicates. High confidence in hand/dermal and inhala
Mixing/Loading Dry Flowable Formulations (2a, b)	PHED V1.1	• 350, 1200, 3200 acres for aerial rice • 350, 1200 acres for aerial on small grains • 80, 200 acres for groundboom on small grains and rice	**Baseline:** Hand, dermal and inhalation data are AB grades. Hand = 7 replicates; inhalation = 23 replicates. Low confidence in hand/dermal data and high confide **PPE:** Hand/dermal data are AB grades. The same inhalation data are used as for protection factor to account for the use of a dust/mist respirator and 90% protectio an organic vapor respirator. Hand = 21 replicates and dermal = 16 to26 replicates hand/dermal data. **Engineering Controls:** No data
			APPLICATOR DESCRIPTORS
Applying Sprays for Aerial Applications (3)	PHED V1.1	• 350, 1,200, 3200 acres on rice • 350, 1200 acres on small grains • 350 acres on sod farms	**Baseline:** Not feasible for this scenario. **PPE:** Not feasible for this scenario. **Engineering Controls:** Hand data are AB grades, dermal are ABC grades, and in Hand = 34 replicates; dermal = 24 to 48 replicates; and inhalation = 23 replicates hand/dermal data. and medium confidence inhalation data.
Applying Sprays with a Groundboom Sprayer (4)	PHED V1.1	• 80, 200 acres on small grains and rice • 80 acres for groundboom on sod farms	**Baseline:** Hand, dermal, and inhalation data are AB grades. Hand = 29 replicate and inhalation = 22 replicates. High confidence in hand/dermal and inhalation da needed to define the unit exposure value. **PPE:** The same dermal and inhalation data are used as for the baseline coupled w account for an additional layer of clothing, and an 80% protection factor to accou respirator and 90% protection factor to account for the use of an organic vapor re are ABC grades, with 21 replicates. Medium confidence in hand/dermal data. **Engineering Controls:** Hand and dermal data are ABC grades, and inhalation ar replicates; dermal =20 to 31 replicates; inhalation = 16 replicates. Medium confi high confidence in inhalation data.
			FLAGGER DESCRIPTORS

Exposure Scenario (Scenario Number)	Data Source	Standard Assumption[a] (8-hr work day)	Comments[b]
Flagging Spray Applications (5)	PHED V1.1	• 350 acres on rice, small grains and sod farms	**Baseline:** Hand data is AB grades, dermal data is AB grade,, and inhalation data are AB grade. Hand = 30 replicates; dermal = 18 to 28 replicates; and inhalation = 28 replicates. High confidence in hand/dermal data, and high confidence in inhalation data. No protection factor was needed to define the unit exposure value. **PPE:** The same hand and dermal data are used as for the baseline coupled with a 50% protection factor to account for an additional layer of clothing. The same inhalation data are used as for the baseline coupled with an 80% protection factor to account for the use of a dust/mist respirator and 90% protection factor to account for the use of an organic vapor respirator. **Engineering Controls:** The same hand, inhalation, and dermal data are used as for the baseline coupled with a 98% protection factor to account for the engineering control of a closed truck.

[a] Standard Assumptions based on an 8-hour work day as estimated by HED. BEAD data were not available.

[b] All handler exposure assessments in this document are based on the "Best Available" data as defined by OREB SOP for meeting Subdivision U Guidelines. Best available grades are assigned to data as follows: matrices with grades A and B data and a minimum of 15 replicates; if not available, then grades A, B and C data and a minimum of 15 replicates; if not available, then all data regardless of the quality (i.e., All Grade Data) and number of replicates. High quality data with a protection factor take precedence over low quality data with no protection factor. Generic data confidence categories are assigned as follows:

High = grades A and B and 15 or more replicates per body part
Medium = grades A, B, and C and 15 or more replicates per body part
Low = grades A, B, C, D and E or any combination of grades with less than 15 replicates

19116

Summary of Non-Cancer Risk Concerns for Occupational Handlers

For the dermal and inhalation, short- and intermediate-term exposure, the target MOE is 300 (a 3x uncertainty factor was applied because of the use of a LOAEL instead of a NOAEL). The calculated dermal and inhalation MOE values were combined for short- and intermediate-term because the dermal and inhalation endpoints were the same. MOEs are calculated for all scenarios at baseline, minimum PPE, maximum PPE, and engineering control level exposures.

Baseline Level

The calculations of short- and intermediate-term combined dermal and inhalation risk indicate that the only scenarios with MOEs that exceed the target MOE of 300 at the **baseline** level are the following:

- (2b) Mixing/loading dry flowable for groundboom application to small grains at 80 acres per day;
- (4) applying sprays, using a groundboom, to rice (6 lbs ai/acre) at 80 acres per day, to rice (3 lbs ai/acre) at 80 and 200 acres per day, and to small grains at 80 and 200 acres per day; and
- (5) flagging for sprays applications on small grains.

Additional PPE

The calculations of short- and intermediate term combined dermal and inhalation risk indicate that the only scenarios with MOEs that exceed the target MOE of 300 at the **additional PPE** level are the following:

- (1a) mixing/loading liquids for aerial application to small grains at 350 acres per day;
- (1b) mixing/loading liquids for groundboom application to rice (6 lbs ai/acre) at 80 acres per day, to rice (3 lbs ai/acre) at 80 and 200 acres per day, and to small grains at 80 and 200 acres per day; and
- (4) applying sprays, using a groundboom, to sod farms at 80 acres per day.

Engineering Controls

The calculations of short- and intermediate term combined dermal and inhalation risk indicate that the only scenarios with MOEs that exceed the target MOE of 300 at the **engineering control** level are the following:

- (1a) mixing/loading liquids for aerial application to rice (3 lbs ai/acre) at 350 acres per day;
- (1b) mixing/loading liquids for groundboom application to sod farms at 80 acres per day;
- (2a) mixing/loading dry flowables for aerial application to rice (6 lbs ai/acre) at 350 and 1200 acres per day, to rice (3 lbs ai/acre) at 350 and 1200 acres per day, and to small grains at 350 and 1200 acres per day;
- (2b) mixing/loading dry flowables for groundboom application to rice (6 lbs ai/acre) at 80 and 200 acres per day, to rice (3 lbs ai/acre) at 80 and 200 acres per day, and to small grains at 200 acres per day;
- (3) applying sprays, using aerial equipment, to rice (3 lbs ai/acre) at 350 acres per day and to small grains at 350 and 1,200 acres per day;
- (4) applying sprays, using a groundboom, to rice at 200 acres per day; and
- (5) flagging for spray application to rice and sod farms.

Occupational Handler Exposure and Risk Estimates for Cancer

Propanil cancer classification is "Suggestive evidence of carcinogenic potential by all routes of exposure, but not sufficient to assess human carcinogenic potential" therefore a occupational handler cancer assessment was not conducted.

Occupational Post Application Exposures and Non-Cancer Risk Estimates

The Worker Protection Standard (WPS) restricted-entry intervals (REIs) for agricultural workers are based solely on the acute dermal toxicity and skin and eye irritation potential of the active ingredient. For propanil, the acute dermal toxicity was toxicity category III, the primary skin irritation potential was toxicity category IV, and the primary eye irritation potential was toxicity category II. A REI of 24 hours was established for propanil based on the primary eye irritation potential toxicity category.

The WPS prohibits routine entry to perform hand labor tasks during the REI and requires PPE to be worn for other early-entry tasks that require contact with treated surfaces. Most of the propanil labels specify the following early entry PPE: long sleeve shirts, long pants, waterproof gloves, shoes, socks, and protective eye wear. A few labels also specify chemical resistant footwear and chemical resistant headgear for overhead exposure.

The transfer coefficients used in this assessment for the use on rice and small grains (barley and spring wheat) are from the Agricultural Re-entry Task Force (ARTF) database. An interim transfer coefficient policy was developed by HED's Science Advisory Council for Exposure using the ARTF database.[7] It is the intention of HED's Science Advisory Council for Exposure that this

policy will be periodically updated to incorporate additional information about agricultural practices in crops and new data on transfer coefficients. Much of this information will originate from exposure studies currently being conducted by the ARTF, from the further analysis of studies already submitted to the Agency, and from the studies in the published scientific literature.

The rice and small grain surrogate assessments use a low transfer coefficient of 100 cm^2/hr for activities such as scouting during minimal foliage development. Propanil's use pattern indicates that it is applied only post-emergent during minimal foliage development. Propanil is applied to rice approximately two weeks after planting and then again at 35-40 days after planting well before harvest time which occurs at approximately 120 - 140 days after planting. Propanil is applied to small grains post-emergent and in the early crop seedling stage (two to five leaf stage).[1] Therefore, the high transfer coefficient for activities such as scouting during full foliage will not be used. The sod farm surrogate assessment used a high transfer coefficient of 16,500 for activities, such as transplanting and weeding, and a low transfer coefficient of 500 for activities, such as aerating, fertilizing, hand pruning, scouting, mechanically weeding.[7] No chemical specific dislodgeable foliar residue (DFR) or turf transferable residue (TTR) data exist. The DFR is derived from using an estimated 20 percent of the rate applied as initial dislodgeable residues for rice and small grains, and 5 percent of the rate applied as initial dislodgeable residues for sod farms. An estimated 10 percent dissipation rate per day for rice, small grains, and sod farms. The duration of post-application exposure is assumed to be short to intermediate term.

The equations used to calculate the post-application in Table 6 are presented below:

Surrogate DFR calculation (rice, small grains, and sod farms):

$$DFR\left(\frac{\mu g}{cm^2}\right) = AR\left(\frac{lb\ ai}{A}\right) \times CF\left(\frac{\mu g/cm^2}{lb\ ai/A}\right) \times F \times (1-DR)^t$$

Where:

AR	=	Application rate (6 lbs ai/A for rice, 1.14 lbs ai/A for small grains, and 10 lbs ai/A for sod farms)
DR	=	Daily dissipation rate (10 percent / day)
t	=	Days after treatment
CF	=	Conversion factor (11.2 μg per cm^2/lb ai per A)
F	=	Fraction retained on foliage (20% for rice and small grains and 5% for sod farms)

24/151

Dose calculation:

$$Dose\ (mg/kg/d) = \frac{(DFR\ (\mu g/cm^2)\ x\ Tc\ (cm^2/hr)\ x\ CF\left(\frac{1\ mg}{1{,}000\ \mu g}\right)\ x\ ED\ (hrs)}{BW\ (kg)}$$

Where:

DFR = Initial DFR or daily DFR (μg/cm^2)
Tc = Transfer coefficient (100 cm^2/hr and 1,500 cm^2/hr for rice and small grains and 16,500 cm^2/hr for sod farms)
CF = Conversion factor (1 mg/1,000 μg)
ED = Exposure duration (8 hours per day)
BW = Body weight (70 kg)

$$MOE = \frac{NOEL\ (mg/kg/d)}{Dose\ (mg/kg/d)}$$

Where:

LOAEL = 9 mg/kg/day
Dose = Calculated dose (mg/kg/day)

Occupational Post-application Non-cancer Risk Summary

For non-cancer risks, the calculated MOE for rice (at the maximum application rate) exceeds the target MOE one day after application for activities such as scouting in minimal foliage development. The calculated MOE for rice (at a typical application rate) exceeds the target MOE on the day of application for activities such as scouting in minimal foliage development. The calculated MOE for small grains exceeds the target MOE on the day of application for activities such as scouting during minimal foliage development. The calculated MOE for sod farms exceeds the target MOE on the day of application for activities such as hand pruning, scouting, mechanical weeding, and irrigation and 18 days after application for activities such as hand and mechanical harvesting, transplanting, and hand weeding (see table 6).

Table 6. Propanil Non-Cancer Post application Assessment

Crop	Maximum Label Application Rate (lbs ai/acre) [a]	Transfer Coefficient[b] (cm^2/hr)	Activity[c]	DAT[d]	DFR[e] ($\mu g/cm^2$)	MOE[f]
Rice	6 (maximum application rate)	100	Scouting minimum foliage development.	0	13.45	293
				1	12.11	325
	3 (typical application rate)	100	Scouting minimum foliage development.	0 (12 hours)	6.72	585
Small Grains	1.14	100	Irrigation and scouting minimum foliage development.	0 (12 hours)	2.56	1541
Turf (Sod Farms)	10	16500	Transplanting and hand weeding.	0	22.42	12
				18	0.84	312
		500	Aerating , fertilizing, hand pruning, scouting, mechanically weeding, hand/mechanically harvesting.	0	5.60	703

Footnotes:

[a] Maximum application rates as stated on current propanil labels.

[b] Transfer Coefficients from Science Advisory Council on Exposure Policy 3.1.[7]

[c] Activities from Science Advisory Council on Exposure Policy 3.1.[7] Every activity listed may not occur for every crop in the group.

[d] DAT is "days after treatment"

[e] Initial DFR ($\mu g/cm^2$) = Application rate (lbs ai/A) x Conversion factor (1 lb ai/acre= 11.209 $\mu g/cm2$) x Fraction of initial ai retained on foliage (20% for rice and small grains and 5% for sod farms)

[f] MOE = LOAEL (mg/kg/day) / Dermal dose (mg/kg/day). Target MOE = 300.

19/96

Occupational Post-application Exposure and Risk Estimates for Cancer

Propanil cancer classification is "Suggestive evidence of carcinogenic potential by all routes of exposure, but not sufficient to assess human carcinogenic potential;" therefore a occupational handler cancer assessment was not conducted.

RESIDENTIAL EXPOSURE AND RISKS

Spray drift is always a potential source of exposure to residents nearby to spraying operations. This is particularly the case with aerial application, but to a lesser extent, groundboom application methods could also be a potential source of exposure. The Agency has been working with the Spray Drift Task Force, EPA Regional Offices and State Lead Agencies for pesticide regulation and other parties to develop the best spray drift management practices. The Agency is now requiring interim mitigation measures for aerial applications that must be placed on product labels/labeling. The Agency has completed its evaluation of the new data base submitted by the Spray Drift Task Force, a membership of U.S. pesticide registrants, and is developing a policy on how to appropriately apply the data and the AgDRIFT computer model to its risk assessments for pesticides applied by air, orchard airblast and ground hydraulic methods. After the policy is in place, the Agency may impose further refinements in spray drift management practices to reduce off-target drift and risks associated with aerial as well as other application types where appropriate.

HED has determined that, other than the possibility of spray drift exposure, there are no potential post-application exposures to residents because propanil is not used in any residential areas. The turf use is restricted to sod farms only. Although propanil treated sod may eventually be used in residential settings (i.e., residential lawns), propanil residues are not expected to occur at levels that would present a residential post-application risk concern. HED has determined that an adequate amount of time will elapse, after the application of propanil, before the placement of sod in residential settings for the following reasons:

- propanil is a post-emergent herbicide that is applied early in the growing season well before harvesting would occur; and
- the time from harvest to placement of the sod in residential settings is anticipated to be at least three days.

Data Gaps and Confidence in Risk Estimates

Any possible data requirements will be discussed during the risk mitigation phase of the reregistration process.

References

1) Propanil Labels. (Registration Numbers: 100-982, 100-1036, 5905-182, 5905-68, 5905-77, 5905-495, 5905-523, 9779-272, 9799-306, 9779-338, 9779-340, 9779-343, 19713-30, 19713-31, 19713-285, 34704-461, 35935-2, 51036-233, 62719-368, 62719-389, 62719-392, 62719-393, 62719-403, 62719-404, 62719-413, 62719-436, 65656-2, 71085-1, 71085-2, 71085-3, 71085-4, 71085-5, 71085-6, 71085-9, 71085-13, 71085-16, 71085-20, 71085-21, 71085-22)

2) Propanil Task Force (2001) Propanil SMART Meeting Discussion. April 17, 2001.

3) Tarplee, B. (2001) Propanil - Report of the FQPA Safety Factor Committee. Washington, D.C.: U.S. Environmental Protection Agency, Office of Pesticide Programs. September 19, 2001.

4) U.S. EPA (1998) PHED Surrogate Exposure Guide, Version 1.1. Washington, D.C.: U.S. Environmental Protection Agency, Office of Pesticide Programs. August 1998.

5) U.S. EPA (1999) Use of Values from the PHED Surrogate Table and Chemical-specific Data, Science Advisory Council for Exposure Policy No. 7. Washington, D.C.: U.S. Environmental Protection Agency, Office of Pesticide Programs. January 28, 1999.

6) U.S. EPA (2000) Standard Values for Daily Acres Treated in Agriculture, Science Advisory Council for Exposure Policy No. 9. Washington, D.C.: U.S. Environmental Protection Agency, Office of Pesticide Programs. July 5, 2000.

7) U.S. EPA (2001) Agricultural Transfer Coefficients, Science Advisory Council for Exposure Policy No. 3.1. Washington, D.C.: U.S. Environmental Protection Agency, Office of Pesticide Programs. August 7, 2000.

8) U.S. EPA (2001) *Evaluation of the Carcinogenic Potential of Propanil: P.C. Code: 028201.* Washington, D.C.: U.S. Environmental Protection Agency, Office of Pesticide Programs. June 19, 2001.

9) U.S. EPA (2001) Reference Files System: Active Products Containing the Active Ingredient 028201. Washington, D.C.: U.S. Environmental Protection Agency, Office of Pesticide Programs. Report Run Date: March 6, 2001.

10) Yang, Y. G. and Makris, S. L. (2001) *Propanil: Report of the Hazard Identification Assessment Review Committee*. Washington, D.C.: U.S. Environmental Protection Agency, Office of Pesticide Programs. August 22, 2001.

28/51

Appendix

29/51

Table A. Occupational Handler Short- and Intermediate-Term Risk to Propanil at Baseline

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (μg/lb ai)[b]	Crop	Application Rate [c]	Amount Treated	Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Inhalation Dose (mg/kg/day)	Inhalation MOE[g]	Total MOE [h]
Mixer/Loader										
Mixing/Loading Liquids for Aerial application (1a)	2.9	1.2	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	17.0	0.53	0.036	250	0.52
					1200 Acres per day	60.0	0.15	0.12	73	0.15
					3200 Acres per day	160.0	0.056	0.33	27	0.056
				3 lbs ai per acre (typical application rate)	350 Acres per day	8.7	1	0.018	500	1.0
					1200 Acres per day	30.0	0.30	0.062	150	0.30
					3200 Acres per day	80.0	0.11	0.16	55	0.11
			Small Grains	1.14 lb ai per acre	350 Acres per day	3.3	3	0.0068	1300	2.7
					1200 Acres per day	11.0	0.82	0.023	380	0.79
			Turf (Sod Farms)	10 lb ai per acre	350 Acres per day	29	0.31	0.06	150	0.31

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (μg/lb ai)[b]	Crop	Application Rate [c]	Amount Treated	Dermal Dose (mg/kg/day)[d]	Dermal MOE [c]	Inhalation Dose (mg/kg/day)	Inhalation MOE[e]	Total MOE [b]
Mixing/Loading Liquids for Groundboom application (1b)	2.9	1.2	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	4.0	2	0.0082	1100	2.3
					200 Acres per day	9.9	0.91	0.021	440	0.90
				3 lbs ai per acre (typical application rate)	80 Acres per day	2.0	5	0.0041	2200	4.5
					200 Acres per day	5.0	2	0.010	880	1.8
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.76	12	0.0016	5800	12
					200 Acres per day	1.9	5	0.0039	2300	4.8
			Turf (Sod Farms)	10 lb ai per acre	80 Acres per day	6.6	1	0.014	660	1.4
Dry Flowables for Aerial application (2a)	0.066	0.77	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.40	23	0.023	390	21
					1200 Acres per day	1.4	6	0.079	110	6.3
					3200 Acres per day	3.6	3	0.21	43	2.3
				3 lbs ai per acre (typical application rate)	350 Acres per day	0.20	45	0.012	780	43.0
					1200 Acres per day	0.68	13	0.040	230	13.0
					3200 Acres per day	1.8	5	0.11	85	4.7

19/16

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (μg/lb ai)[b]	Crop	Application Rate [c]	Amount Treated	Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Inhalation Dose (mg/kg/day)	Inhalation MOE[g]	Total MOE [h]
Dry Flowables for Aerial application (2a)	0.066	0.77	Small Grains	1.14 lb ai per acre	350 Acres per day	0.075	120	0.0044	2100	110
					1200 Acres per day	0.26	35	0.015	600	33
Dry Flowables for Groundboom application (2b)	0.066	0.77	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	0.091	99	0.0053	1700	94
					200 Acres per day	0.23	39	0.013	680	38
				3 lbs ai per acre (typical application rate)	80 Acres per day	0.045	200	0.0026	3400	190.0
					200 Acres per day	0.11	82	0.0066	1400	75.0
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.017	530	0.0010	9000	490
					200 Acres per day	0.043	210	0.0025	3600	200
Applicator										
Sprays for Aerial application (3)	No Data	No Data	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	No Data	No Data	No Data	No Data	No Data
					1200 Acres per day	No Data	No Data	No Data	No Data	No Data
					3200 Acres per day	No Data	No Data	No Data	No Data	No Data
				3 lbs ai per acre (typical application rate)	350 Acres per day	No Data	No Data	No Data	No Data	No Data
					1200 Acres per day	No Data	No Data	No Data	No Data	No Data

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (µg/lb ai)[b]	Crop	Application Rate [c]	Amount Treated	Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Inhalation Dose (mg/kg/day)	Inhalation MOE[g]	Total MOE [h]
					3200 Acres per day	No Data	No Data	No Data	No Data	No Data
Sprays for Aerial application (3)	No Data	No Data	Small Grains	1.14 lb ai per acre	350 Acres per day	No Data	No Data	No Data	No Data	No Data
					1200 Acres per day	No Data	No Data	No Data	No Data	No Data
			Turf (Sod Farm)	10 lb ai per acre	350 Acres per day	No Data	No Data	No Data	No Data	No Data
Sprays for Groundboom application (4)	0.014	0.74	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	0.019	470	0.0051	1800	370
					200 Acres per day	0.048	190	0.013	710	150
				3 lbs ai per acre (typical application rate)	80 Acres per day	0.0096	940	0.0025	3500	740.0
					200 Acres per day	0.024	380	0.0063	1400	300.0
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.0036	2500	0.00096	9300	2000
					200 Acres per day	0.0091	990	0.0024	3700	780
			Turf (Sod Farm)	10 lb ai per acre	80 Acres per day	0.032	280	0.0085	1100	220

19/88

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (μg/lb ai)[b]	Crop	Application Rate [c]	Amount Treated	Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Inhalation Dose (mg/kg/day)	Inhalation MOE[g]	Total MOE [h]
Flagger										
Flagging for Sprays application (5)	0.011	0.35	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.066	140	0.011	860	120
				3 lbs ai per acre (typical application rate)	350 Acres per day	0.033	270	0.0053	1700	240.0
			Small Grains	1.14 lb ai per acre	350 Acres per day	0.013	690	0.0020	4500	620
			Turf (Sod Farm)	10 lb ai per acre	350 Acres per day	0.11	82	0.018	510	71

Footnotes:

a Baseline dermal unit exposure represents long pants, long sleeved shirt, no gloves, open mixing/loading, and open cab tractor

b Baseline inhalation unit exposure represents no respirator.

c Application Rates are based on the maximum application rates listed on the Propanil labels.

d Daily Dermal Dose (mg/kg/day) = (Daily Dermal Exposure (mg/day) / Body Weight (70 kg)).

e Dermal MOE = LOAEL (9 mg/kg/day) / Daily Dermal Dose (mg/kg/day) . The target MOE value is 300.

f Daily Inhalation Dose (mg/kg/day) = Daily Inhalation Exposure (mg/day) / Body weight (70kg).

g Inhalation MOE = LOAEL (9 mg/kg/day) / Daily Inhalation Dose (mg/kg/day). The target MOE value is 300.

h Total MOE (combined dermal and inhalation) = 1 / ((1/dermal MOE) + (1/inhalation MOE)). The target MOE value is 300.

9/19/91

Table B. Occupational Handler Short- and Intermediate-Term Risk to Propanil with Minimum PPE

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)[f]	Inhalation MOE [g]	Total MOE [h]
Mixer/Loader										
Mixing/Loading Liquids for Aerial application (1a)	0.023	0.24	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.14	65	0.0072	1300	62
					1200 Acres per day	0.47	19	0.025	370	18
					3200 Acres per day	1.3	7	0.066	140	6.8
				3 lb ai per acre (typical application rate)	350 Acres per day	0.069	130	0.0036	2500	120.0
					1200 Acres per day	0.24	38	0.012	730	36.0
					3200 Acres per day	0.63	14	0.033	270	14.0
			Small Grains	1.14 lb ai per acre	350 Acres per day	0.026	340	0.0014	6600	330
					1200 Acres per day	0.090	100	0.0047	1900	95
			Turf (Sod Farms)	10 lb ai per acre	350 Acres per day	0.23	39	0.012	750	37

19/93

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)[f]	Inhalation MOE [g]	Total MOE [h]
Mixing/Loading Liquids for Groundboom application (1b)	0.023	0.24	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	0.032	290	0.0016	5500	270
					200 Acres per day	0.079	110	0.0041	2200	110
				3 lb ai per acre (typical application rate)	80 Acres per day	0.016	570	0.00082	11000	540.0
					200 Acres per day	0.039	230	0.0021	4400	220.0
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.0060	1500	0.00031	29000	1400
					200 Acres per day	0.015	600	0.00078	12000	570
			Turf (Sod Farms)	10 lb ai per acre	80 Acres per day	0.053	170	0.0027	3300	160
Dry Flowables for Aerial application (2a)	0.066	0.15	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.40	23	0.0045	2000	22
					1200 Acres per day	1.4	7	0.015	580	6.6
					3200 Acres per day	3.6	2	0.041	220	2.5
				3 lb ai per acre (typical application rate)	350 Acres per day	0.20	45	0.0023	4000	45.0
					1200 Acres per day	0.68	13	0.0077	1200	13.0
					3200 Acres per day	1.8	5	0.021	440	4.9

9/5/2

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)[f]	Inhalation MOE [g]	Total MOE [h]
Dry Flowables for Aerial application (2a)	0.066	0.15	Small Grains	1.14 lb ai per acre	350 Acres per day	0.075	120	0.00086	11000	120
					1200 Acres per day	0.26	35	0.0029	3100	34
Dry Flowables for Groundboom application (2b)	0.066	0.15	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	0.091	99	0.0010	8800	98
					200 Acres per day	0.23	40	0.0026	3500	39
				3 lb ai per acre (typical application rate)	80 Acres per day	0.045	200	0.00051	18000	200.0
					200 Acres per day	0.11	80	0.0013	7000	79.0
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.017	520	0.00020	46000	520
					200 Acres per day	0.043	210	0.00049	18000	210
Applicator										
Sprays for Aerial application (3)	No Data	No Data	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	No Data	No Data	No Data	No Data	No Data
					1200 Acres per day	No Data	No Data	No Data	No Data	No Data
					3200 Acres per day	No Data	No Data	No Data	No Data	No Data

3/7/91

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[a]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)[f]	Inhalation MOE [g]	Total MOE [h]
Sprays for Aerial application (3)	No Data	No Data	Rice	3 lb ai per acre (typical application rate)	350 Acres per day	No Data	No Data	No Data	No Data	No Data
					1200 Acres per day	No Data	No Data	No Data	No Data	No Data
					3200 Acres per day	No Data	No Data	No Data	No Data	No Data
			Small Grains	1.14 lb ai per acre	350 Acres per day	No Data	No Data	No Data	No Data	No Data
					1200 Acres per day	No Data	No Data	No Data	No Data	No Data
			Turf (Sod Farm)	10 lb ai per acre	350 Acres per day	No Data	No Data	No Data	No Data	No Data
Sprays for Groundboom application (4)	0.014	0.15	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	0.019	470	0.0010	8800	440
					200 Acres per day	0.048	190	0.0026	3500	180
			Rice	3 lb ai per acre (typical application rate)	80 Acres per day	0.0096	940	0.00051	18000	890.0
					200 Acres per day	0.024	380	0.0013	7000	360.0
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.0036	2500	0.00020	46000	2300
					200 Acres per day	0.0091	990	0.00049	18000	940
			Turf (Sod Farm)	10 lb ai per acre	80 Acres per day	0.032	280	0.0017	5300	270

10/91

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)[f]	Inhalation MOE [g]	Total MOE [h]
Flagger										
Flagging for Sprays application (5)	0.01	0.07	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.06	150	0.0021	4300	140
				3 lb ai per acre (typical application rate)	350 Acres per day	0.03	300	0.0011	8600	290.0
			Small Grains	1.14 lb ai per acre	350 Acres per day	0.011	790	0.00040	23000	760
			Turf (Sod Farm)	10 lb ai per acre	350 Acres per day	0.1	90	0.0035	2600	87

Footnotes:

a Baseline dermal unit exposure represents long pants, long sleeved shirt, no gloves, open mixing/loading, and open cab tractor

b Baseline inhalation unit exposure represents no respirator.

c Application Rates are based on the maximum application rates listed on the Propanil labels.

d Daily Dermal Dose (mg/kg/day) = (Daily Dermal Exposure (mg/day) / Body Weight (70 kg)).

e Dermal MOE = LOAEL (9 mg/kg/day) / Daily Dermal Dose (mg/kg/day) . The target MOE value is 300.

f Daily Inhalation Dose (mg/kg/day) = Daily Inhalation Exposure (mg/day) / Body weight (70kg).

g Inhalation MOE = LOAEL (9 mg/kg/day) / Daily Inhalation Dose (mg/kg/day). The target MOE value is 300.

h Total MOE (combined dermal and inhalation) = 1 / ((1/dermal MOE) + (1/inhalation MOE)). The target MOE value is 300.

29/61

Table C. Occupational Handler Short- and Intermediate-Term Risk to Propanil with Maximum PPE

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)	Inhalation MOE [g]	Total MOE [h]
Mixer/Loader										
Mixing/Loading Liquids for Aerial application (1a)	0.017	0.12	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.10	88	0.0036	2500	85
					1200 Acres per day	0.35	26	0.012	730	25
					3200 Acres per day	0.93	10	0.033	270	9.3
				3 lb ai per acre (typical application rate	350 Acres per day	0.051	180	0.0018	5000	170.0
					1200 Acres per day	0.17	51	0.0062	1500	50.0
					3200 Acres per day	0.47	19	0.016	550	19.0
			Small Grains	1.14 lb ai per acre	350 Acres per day	0.019	460	0.00068	13000	450
					1200 Acres per day	0.066	140	0.0023	3800	130
			Turf (Sod Farms)	10 lb ai per acre	350 Acres per day	0.17	53	0.006	1500	51

10/5/1

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)[f]	Inhalation MOE [g]	Total MOE [h]
Mixing/Loading Liquids for Groundboom application (1b)	0.017	0.12	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	0.023	390	0.00082	11000	370
					200 Acres per day	0.058	150	0.0021	4400	150
				3 lb ai per acre (typical application rate	80 Acres per day	0.012	770	0.00041	22000	750.0
					200 Acres per day	0.029	310	0.0010	8800	300.0
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.0044	2000	0.00016	58000	2000
					200 Acres per day	0.011	810	0.00039	23000	780
Mixing/Loading Liquids for Groundboom application (1b)	0.017	0.12	Turf (Sod Farms)	10 lb ai per acre	80 Acres per day	0.039	230	0.0014	6600	220
Dry Flowables for Aerial application (2a)	0.047	0.077	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.28	32	0.0023	3900	32
					1200 Acres per day	0.97	9	0.0079	1100	9.2
					3200 Acres per day	2.6	3	0.021	430	3.5

11/16

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)[f]	Inhalation MOE [g]	Total MOE [h]
Dry Flowables for Aerial application (2a)	0.047	0.077	Rice	3 lb ai per acre (typical application rate	350 Acres per day	0.14	64	0.0012	7800	63.0
					1200 Acres per day	0.48	19	0.0040	2300	18.0
					3200 Acres per day	1.3	7	0.011	850	6.9
			Small Grains	1.14 lb ai per acre	350 Acres per day	0.054	170	0.00044	21000	170
					1200 Acres per day	0.18	49	0.0015	6000	49
Dry Flowables for Groundboom application (2b)	0.047	0.077	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	0.064	140	0.00053	17000	140
					200 Acres per day	0.16	56	0.0013	6800	55
				3 lb ai per acre (typical application rate	80 Acres per day	0.032	280	0.00026	34000	280.0
					200 Acres per day	0.081	110	0.00066	14000	110.0
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.012	740	0.00010	90000	730
					200 Acres per day	0.031	290	0.00025	36000	290

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)	Dermal MOE [a]	Daily Inhalation Dose (mg/kg/day)	Inhalation MOE [a]	Total MOE [b]
Applicator										
Sprays for Aerial application (3)	No Data	No Data	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	No Data	No Data	No Data	No Data	No Data
					1200 Acres per day	No Data	No Data	No Data	No Data	No Data
					3200 Acres per day	No Data	No Data	No Data	No Data	No Data
				3 lb ai per acre (typical application rate	350 Acres per day	No Data	No Data	No Data	No Data	No Data
					1200 Acres per day	No Data	No Data	No Data	No Data	No Data
					3200 Acres per day	No Data	No Data	No Data	No Data	No Data
Sprays for Aerial application (3)	No Data	No Data	Small Grains	1.14 lb ai per acre	350 Acres per day	No Data	No Data	No Data	No Data	No Data
					1200 Acres per day	No Data	No Data	No Data	No Data	No Data
			Turf (Sod Farm)	10 lb ai per acre	350 Acres per day	No Data	No Data	No Data	No Data	No Data

19/61

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)	Inhalation MOE [g]	Total MOE [h]
Sprays for Groundboom application (4)	0.011	0.074	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	0.015	600	0.00051	18000	580
					200 Acres per day	0.038	240	0.0013	7100	230
				3 lb ai per acre (typical application rate	80 Acres per day	0.0075	1200	0.00025	35000	1200.0
					200 Acres per day	0.019	480	0.00063	14000	460.0
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.0029	3100	0.000096	93000	3000
					200 Acres per day	0.0072	1300	0.00024	37000	1200
			Turf (Sod Farm)	10 lb ai per acre	80 Acres per day	0.025	360	0.00085	11000	350
Flagger										
Flagging for Sprays application (5)	0.01	0.035	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.06	150	0.0011	8600	150
				3 lb ai per acre (typical application rate	350 Acres per day	0.03	300	0.00053	17000	290.0
			Small Grains	1.14 lb ai per acre	350 Acres per day	0.011	790	0.00020	45000	780

19/11

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)	Inhalation MOE [g]	Total MOE [h]
			Turf (Sod Farm)	10 lb ai per acre	350 Acres per day	0.1	90	0.0018	5100	88

Footnotes:

a Baseline dermal unit exposure represents long pants, long sleeved shirt, no gloves, open mixing/loading, and open cab tractor

b Baseline inhalation unit exposure represents no respirator.

c Application Rates are based on the maximum application rates listed on the Propanil labels.

d Daily Dermal Dose (mg/kg/day) = (Daily Dermal Exposure (mg/day) / Body Weight (70 kg)).

e Dermal MOE = LOAEL (9 mg/kg/day) / Daily Dermal Dose (mg/kg/day) . The target MOE value is 300.

f Daily Inhalation Dose (mg/kg/day) = Daily Inhalation Exposure (mg/day) / Body weight (70kg).

g Inhalation MOE = LOAEL (9 mg/kg/day) / Daily Inhalation Dose (mg/kg/day). The target MOE value is 300.

h Total MOE (combined dermal and inhalation) = 1 / ((1/dermal MOE) + (1/inhalation MOE)). The target MOE value is 300.

4/5/61

Table D. Occupational Handler Short- and Intermediate-Term Risk to Propanil with Engineering Controls

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)	Inhalation MOE [g]	Total MOE [h]
Mixer/Loader										
Mixing/Loading Liquids for Aerial application (1a)	0.0086	0.083	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.052	170	0.0025	3600	170
					1200 Acres per day	0.18	51	0.0085	1100	49
					3200 Acres per day	0.47	19	0.023	400	18
				3 lb ai per acre (typical application rate	350 Acres per day	0.026	350	0.0012	7200	330.0
					1200 Acres per day	0.088	100	0.0043	2100	97.0
					3200 Acres per day	0.24	38	0.011	790	36.0
			Small Grains	1.14 lb ai per acre	350 Acres per day	0.0098	920	0.00047	19000	880
					1200 Acres per day	0.034	270	0.0016	5500	260
			Turf (Sod Farms)	10 lb ai per acre	350 Acres per day	0.086	110	0.0042	2200	10
Mixing/Loading Liquids for Groundboom application (1b)	0.0086	0.083	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	0.012	760	0.00057	16000	730
					200 Acres per day	0.029	310	0.0014	6300	290

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)	Inhalation MOE [g]	Total MOE [h]
Mixing/Loading Liquids for Groundboom application (1b)	0.0086	0.083	Rice	3 lb ai per acre (typical application rate	80 Acres per day	0.0059	1500	0.00028	32000	1500.0
					200 Acres per day	0.015	610	0.00071	13000	580.0
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.0022	4000	0.00011	83000	3800
					200 Acres per day	0.0056	1600	0.00027	33000	1500
Mixing/Loading Liquids for Groundboom application (1b)	0.0086	0.083	Turf (Sod Farms)	10 lb ai per acre	80 Acres per day	0.020	460	0.00095	9500	440
Dry Flowables for Aerial application (2a)	0.0013	0.015	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.0078	1200	0.00045	20000	1100
					1200 Acres per day	0.027	340	0.0015	5800	320
					3200 Acres per day	0.071	130	0.0041	2200	120
				3 lb ai per acre (typical application rate	350 Acres per day	0.0039	2300	0.00023	40000	2200.0
					1200 Acres per day	0.013	670	0.00077	12000	640.0
					3200 Acres per day	0.036	250	0.0021	4400	240.0
			Small Grains	1.14 lb ai per acre	350 Acres per day	0.0015	6100	0.000086	110000	5700

477/61

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)	Inhalation MOE [g]	Total MOE [h]
					1200 Acres per day	0.0051	1800	0.00029	31000	1700

9/8/97

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)	Inhalation MOE [g]	Total MOE [h]
Dry Flowables for Groundboom application (2b)	0.0013	0.015	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	0.0018	5000	0.00010	88000	4800
					200 Acres per day	0.0045	2000	0.00026	35000	1900
				3 lb ai per acre (typical application rate	80 Acres per day	0.00089	10000	0.000051	180000	9500.0
					200 Acres per day	0.0022	4000	0.00013	70000	3800.0
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.00034	27000	0.000020	460000	25000
					200 Acres per day	0.00085	11000	0.000049	180000	10000
Applicator										
Sprays for Aerial application (3)	0.005	0.068	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.03	300	0.0020	4400	280
					1200 Acres per day	0.10	87	0.0070	1300	82
					3200 Acres per day	0.27	33	0.019	480	31
				3 lb ai per acre (typical application rate	350 Acres per day	0.015	600	0.0010	8800	560.0
					1200 Acres per day	0.051	180	0.0035	2600	160.0
					3200 Acres per day	0.14	66	0.0093	970	61.0

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)	Inhalation MOE [g]	Total MOE [h]
Sprays for Aerial application (3)	0.005	0.068	Small Grains	1.14 lb ai per acre	350 Acres per day	0.0057	1600	0.00039	23000	1500
					1200 Acres per day	0.020	460	0.0013	6800	430
			Turf (Sod Farm)	10 lb ai per acre	350 Acres per day	0.05	180	0.0034	2600	170
Sprays for Groundboom application (4)	0.005	0.043	Rice	6 lb ai per acre (maximum application rate)	80 Acres per day	0.0069	1300	0.00029	31000	1300
					200 Acres per day	0.017	530	0.00074	12000	500
				3 lb ai per acre (typical application rate	80 Acres per day	0.0034	2600	0.00015	61000	2500.0
					200 Acres per day	0.0086	1100	0.00037	24000	1000.0
			Small Grains	1.14 lb ai per acre	80 Acres per day	0.0013	6900	0.000056	160000	6600
					200 Acres per day	0.0033	2800	0.00014	64000	2600
			Turf (Sod Farm)	10 lb ai per acre	80 Acres per day	0.011	790	0.00049	18000	760

59/51

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[a]	Inhalation Unit Exposure (Ug/lb ai)[b]	Crop	Application Rate[c]	Amount Treated	Daily Dermal Dose (mg/kg/day)[d]	Dermal MOE [e]	Daily Inhalation Dose (mg/kg/day)	Inhalation MOE [g]	Total MOE [h]
Flagger										
Flagging for Sprays application (5)	0.00022	0.007	Rice	6 lb ai per acre (maximum application rate)	350 Acres per day	0.0013	6800	0.00021	43000	5900
				3 lb ai per acre (typical application rate	350 Acres per day	0.00066	14000	0.00011	86000	12000.0
			Small Grains	1.14 lb ai per acre	350 Acres per day	0.00025	36000	0.000040	230000	31000
			Turf (Sod Farm)	10 lb ai per acre	350 Acres per day	0.0022	4100	0.00035	26000	3500

Footnotes:

a Baseline dermal unit exposure represents long pants, long sleeved shirt, no gloves, open mixing/loading, and open cab tractor

b Baseline inhalation unit exposure represents no respirator.

c Application Rates are based on the maximum application rates listed on the Propanil labels.

d Daily Dermal Dose (mg/kg/day) = (Daily Dermal Exposure (mg/day) / Body Weight (70 kg)).

e Dermal MOE = LOAEL (9 mg/kg/day) / Daily Dermal Dose (mg/kg/day) . The target MOE value is 300.

f Daily Inhalation Dose (mg/kg/day) = Daily Inhalation Exposure (mg/day) / Body weight (70kg). The target MOE value is 300.

g Inhalation MOE = LOAEL (9 mg/kg/day) / Daily Inhalation Dose (mg/kg/day). The target MOE value is 300.

h Total MOE (combined dermal and inhalation) = 1 / ((1/dermal MOE) + (1/inhalation MOE)).

6/1/7